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IMPROVEMENTS TO CENTRIFUGATION OF SYNTHETIC RUBBER LATEX5 Field of Invention

This invention is an addition and complements our co-pending Malaysian Patent Application No. PI 20014729 which discloses improvements in or relating to the concentration of  
10 natural rubber latex by centrifugation using commercially available centrifuge machines. The present invention relates to the concentration of synthetic rubber latex by centrifugation using conventional centrifuge machines.

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Background of Invention

The centrifugation process for concentration of natural rubber latex is very well known and widely practiced in all  
20 natural rubber-producing countries. In our co-pending Malaysian Patent Application No. PI 20014729, a method was described by which the efficiency of cream separation can be increased from the conventional range of 85% - 89% to more than 95%, thereby significantly improving productivity,  
25 reducing costs and diminishing the quantum of low market-value skim rubber.

Conventionally, the centrifugation process is not normally applied in concentrating synthetic rubber emulsions. Instead  
30 the conventional techniques used are evaporation by heating and creaming with creaming agents. Centrifugation of synthetic emulsion polymerised latices is hampered by the small size of the latex particles of synthetic rubber. The

size of the synthetic rubber particles is in the order of those obtaining in particles of natural latex skim fraction. Thus, commercially, the industry currently resorts to creaming or evaporation methods to concentrate synthetic rubber latex.

Agglomeration of the synthetic latex particles through freezing has been attempted as an alternative concentration method; however it was not found to be commercially viable.

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#### Objects and Summary of the Invention

It is an object and purpose of the present invention to provide for a process of concentration of synthetic rubber latex using conventional centrifuge without the above-mentioned drawbacks.

In our co-pending application, the invention was applied to the centrifugation of natural rubber latex. We have now established that the process also applies to emulsion polymerised synthetic rubber lattices.

To achieve the foregoing object, the present invention provides for a process of concentrating emulsion polymerised synthetic rubber lattices comprising effecting clustering of the latex particles prior to centrifugation using commercially available centrifuges. Preferably, the clustering is effected by creaming agents such as tamarind seed powder or alginates (including ammonium alginate).

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In one preferred embodiment, the clustering of the synthetic lattices is effected by adding from 0.05% to 1.0% on latex of

the creaming agent and kept standing for 2 to 24 hours prior to centrifugation. Preferably still, the separation of cream and stabilization is further improved by the addition of a soap including ammonium oleate.

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In one preferred embodiment of the process, mechanical centrifugation using commercial centrifuge means for producing synthetic rubber latex concentrates is employed.

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#### Detailed Description of the Invention

The principle of clustering of latex particles using latex creaming agents followed by centrifugation was never  
15 conceived or tested by the synthetic latex industry. We have now established that the technique applied to natural rubber latex as disclosed in our said co-pending Malaysian patent application No. PI 20014729 can also be effectively applied to synthetic rubber latices, in particular all emulsion  
20 polymerised diene rubbers latices such as styrene-butadiene rubber (SBR) latex, neoprene latex, etc.

The technique generally entails, firstly, adding creaming agents, such as tamarind seed powder or alginate (including  
25 ammonium alginate) to the synthetic rubber latex so that clustering of the latex particles may be achieved. The clustered latex particles are thus larger and are thus able to be centrifuged in the usual manner using conventional centrifuges to separate the concentrate from the skim.

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The two examples in the following illustrate the efficacy of the process.

Treatment Procedure for both Example I and Example II:

- i. SBR and neoprene latices are separately treated with 0.07% ammonium alginate or 0.16% tamarind seed powder, both in solution form and kept standing for 2 to 24 hours and then centrifuged in the usual manner.
- ii. Control SBR and neoprene latices treated with the creaming agents are also kept standing for 2 to 3 weeks to allow creaming to take effect.
- iii. The dry rubber content (DRC) of the centrifuged lattices after 24 hours and the creamed lattices after 3 weeks are then determined.

The tables below show the results obtained.

Example ITamarind Seed Powder as creaming agent (0.7% on DRC)

Treatment	DRC	
	SBR	Neoprene
Control	25.0	22.0
Centrifuged after clustering	50.0	52.0
Creamed at 2 weeks	35.0	38.0

Example II  
Ammonium Alginate as creaming agent (0.1% of DRC)

Treatment	DRC	
	SBR	Neoprene
Control	25.0	22.0
Centrifuged after clustering	51.0	51.0
Centrifuged after clustering & addition of 0.2% ammonium oleate	53.0	52.0

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From the above results it is apparent that the clustering of the synthetic latex rubber particles using tamarind seed powder or ammonium alginate prior to centrifuging is effective in concentrating SBR and neoprene latices to levels comparable to that of natural rubber latex. It is also effective with carboxylated SBR latex and nitrile (NBR) latex.

It will be apparent to a person skilled in the art that the above-described process may be adapted for other synthetic rubber latices formed of emulsion polymerised diene apart from the above two specific examples of SBR and neoprene. It may also be possible to use other suitable compounds or compositions as creaming agents apart from ammonium alginate or tamarind seed powder described above. In fact, the clustering agents used can be any product commercially used in the natural rubber latex creaming process. These and other substitutes not specifically described herein are not to be considered as departures from the present invention and shall be considered as falling within the letter and spirit of the following claims.

CLAIMSWhat we claim is:

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1. A process of concentrating emulsion polymerised synthetic rubber lattices comprising effecting clustering of the latex particles prior to centrifugation using  
10 commercially available centrifuges.
2. A process described in Claim 1 wherein the clustering is effected by creaming agents.
- 15 3. A process according to Claim 2 wherein the creaming agents include any one of tamarind seed powder and alginates, including ammonium alginate.
4. A process according to any one of Claims 1 and 2 wherein  
20 the clustering of the synthetic lattices is effected by adding from 0.05% to 1.0% on latex of the creaming agent and kept standing for 2 to 24 hours prior to centrifugation.
5. A process according to any one of Claims 1 to 3 wherein  
25 the separation of cream and stabilization is further improved by the addition of a soap including ammonium oleate.
6. A process according to any one of the preceding claims further comprising mechanical centrifugation using commercial  
30 centrifuge means for producing synthetic rubber latex concentrates.

7. A latex composition prepared according to a method claimed in any one of Claims 1 to 5.

8. A latex concentrate obtained according to any one of  
5 Claims 1 to 6.

9. A product produced from a latex concentrate according to Claim 8.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SG03/00173

**A. CLASSIFICATION OF SUBJECT MATTER**Int. Cl. <sup>7</sup>: C08C 1/10, 1/08, C08F 6/20, 6/18, 136/18, 236/18.

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC Int. Cl. <sup>7</sup> C08C 1/10, 1/08, C08F 6/20, 6/18, 136/18, 236/18.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

US Classification; Class 528 subclass 937, ECLA C08C 1/10, 1/08.

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Derwent (WPAT and JAPIO) and Chemical Abstracts

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DD 134770 (VEB Chemische Werke Buna) 21 March 1979 (see entire document)	1-9
X	US 2423766 (Freeman R. D.) 8 July 1947 (see entire patent, in particular column 1 lines 30-38, column 1 line 56 to column 2 line 43, column 5 lines 41-56 and claim 5)	1-4, 6-9
X	GB 582700 (E. I. Du Pont de Nemours and Co.) 25 November 1946 (see entire specification, in particular Example 5 (page 3 lines 7-30) and page 4 lines 35-45)	1-9

☒ Further documents are listed in the continuation of Box C☐ See patent family annex

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed.

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search  
26 September 2003

Date of mailing of the international search report

8 OCT 2003

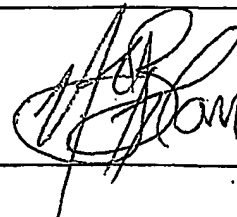
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## INTERNATIONAL SEARCH REPORT

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Derwent Abstract Accession no. 94411 D/51, Class A18, SU 812788 (Khazanovich I G) 15 March 1981 (see entire abstract)	6
X	DD 143263 (VEB Chemische Werke Buna) 13 August 1980 (see entire document)	1-9
X, Y	US 1754535 (Wescott W. B.) 15 April 1930 (see entire document, in particular page 1 lines 98-100)	1-9
X	GB 618299 (The B. F. Goodrich Company) 18 February 1949 (see entire document, in particular the examples and page 3 lines 63-67)	1-9
X	US 2444801 (Erving Arundale) 6 July 1948 (see entire patent, in particular column 1 lines 44-47, column 2 lines 23-54, column 5 lines 31-39)	1-9
Y	GB 598872 (Clayton T.A.) 27 February 1948 (see page 1 lines 18-22 and lines 72-95)	1-9